THE ENERGY DENSITY OF SOLAR WIND AND ITS CORRELATION WITH COSMIC RAY INTENSITY

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In a recent investigation Snyder *et al.* (1963) found a strong correlation between the daily average velocity of solar wind measured with the space probe Mariner 2 at a distance of 0.7 to 1.0 AU and the geomagnetic planetary index K_p for the period Aug. 20 thru Dec. 17, 1962. They compared the average plasma velocity with data on daily mean cosmic ray intensity and also the diurnal variations of cosmic ray intensity but found no significant correlations. Snyder (1964) calculated the number density, temperature and energy density Kev/cm^3 of the interplanetary plasma with certain simplyfying assumptions (e.g. Maxwell-Boltzmann velocity distribution etc.) In the present study a power spectrum analysis (Blackman and Tukey 1958) is made on the daily mean energy density (actually daily average of three hour averages) and the daily mean cosmic ray intensity recorded at Climax for the period Aug. 29 thru. Dec. 17, 1962. Fig. 1 shows the

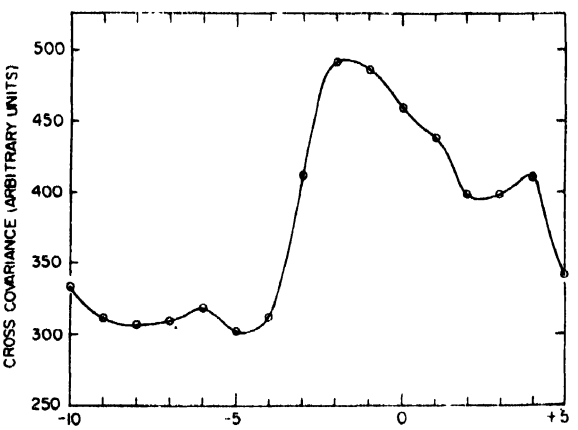

Fig. 1

cross covariance function from -10 to $+5$ days. It can be seen from Fig. 1 that the cross covariance reaches a maximum value around -2 to -1 days. The linear cross correlation coefficient corresponding to the peak in Fig. 1 is $+0.56 \pm 0.06$. The power spectrum of each of the time series shows that they have approximately same periodicities of the order of 25 days and the cross spec-

trum indicates that the maximum contribution to the cross covariance comes from periods of the same order.

In view of the present day accepted theories of cosmic ray intensity variations, interplanetary plasma variations and geomagnetic disturbances the lack of dependence of K_p variations on kinetic pressure of interplanetary plasma (Snyder *et al.* 1963) and the present correlation of cosmic ray intensity changes with the energy density, particularly the phase lag, are interesting. The computations will be extended to the plasma data collected in 1963 for well over six months (Snyder 1964) and if the present results are confirmed many important conclusions can be arrived regarding interplanetary gas dynamics and solar modulation of galactic cosmic rays.

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